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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,651	02/04/2004	Dong-Kil Shin	9898-341	5815

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MARGER JOHNSON & MCCOLLOM, P.C.
210 SW MORRISON STREET, SUITE 400
PORTLAND, OR 97204

EXAMINER	
WARREN, MATTHEW E	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/772,651	SHIN ET AL.	
	Examiner	Art Unit	
	Matthew E. Warren	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/27/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the Amendment filed on April 5, 2005.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 14-16, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Hikata et al. (US 6,133,637).

In re claim 14, Hikata et al. also disclose (col. 5, lines 8-55) a method of manufacturing a multi-chip package comprising: vertically stacking at least two semiconductor chips (14 and 16) on a substrate (lead frame 12a and 12b); the two chips having upper, lower, and side surfaces; bonding a bond pad (14b) on at least one of the at least two semiconductor chips to a bond finger (12b) on the substrate with a bonding wire (W); forming a soft element (26) on at least one side of at least one of the at least two chips; and encapsulating the semiconductor chips and the soft element using a mold resin (22).

In re claims 15 and 16, Hikata et al. shows (fig. 9) that the method includes forming the soft element on an entire surface of the upper chip (16) and a portion of the side of the lower chip (14).

In re claim 20, Hikata et al. discloses (col. 5, lines 24-28 and col. 6, lines 25-33) that the soft element comprises elastomer or epoxy resin.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikata et al. (US 6,133,637) in view of Kondo et al. (JP 63-240053 A).

In re claim 1, Hikata et al. shows (fig. 9) a multi-chip package comprising: at least two semiconductor chips (14 and 16) vertically mounted on a substrate (12a) and encapsulated with a mold resin (22); and a soft element (elastomer or epoxy resin 18) located between at least one of the at least two semiconductor chips and the mold resin, the soft element being more elastic and flexible than the mold resin (col. 5, lines 24-38). Because the soft element of Hikata is formed of the same materials and structure as the applicant's claimed invention, it is also inherently configured to reduce the constrictive force of the encapsulant on the surface.

In re claims 2 and 3, Hikata et al. shows (fig. 9) a soft element (epoxy resin 26) contacts an entire surface of the side or a portion of the side of the semiconductor chips.

In re claims 4 and 5, Kondo shows (fig. 2) that the soft element contacts the entire upper surface of the chip or a portion of the upper surface of the chip (as shown in figures 1 or 3).

In re claim 6, Hikata et al. discloses (col. 5, lines 24-28) that an adhesive is applied for adhesion between the substrate and the semiconductor chips. Because the soft element of Hikata is formed of the same materials and structure as the applicant's claimed invention, it is also inherently configured to increase vertical mobility of the semiconductor chips against a load of the adhesive applied to the semiconductor chips upon cooling.

In re claim 7, Hikata et al. discloses (col. 6, lines 24-38 and col. 6, lines 25-33) that the soft element comprises elastomer or epoxy resin.

In re claim 21, although Hikata shows that a soft element is disposed between the two chips in figure 10, Hikata shows in figure 49 that there is no soft element between the chips, and when combined with Kondo, the soft element (9) of Kondo would be formed on the uppermost chip and not between the two chips of Hikata. Kondo shows that the soft element is not disposed between the chip (1) and lead frame (2).

In re claim 22, Hikata et al. discloses (col. 5, lines 24-28) that the soft element (18) is an epoxy or elastomer without any filler while the material (26) on the side of the chip is an epoxy or elastomer having a filler to increase moisture resistance (col. 6, lines 25-33). However, the soft element of Kondo does not contain any filler.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikata et al. (US 6,133,637) in view of Kondo et al. (JP 63-240053 A) as applied to claim 1 above, and further in view of Derderian (US 6,569,709 B2).

In re claims 8 and 9, Hikata and Kondo. show all of the elements of the claims except the solder balls as terminals for connecting the package to an external circuit and the substrate being a PCB. Derderian et al. shows (fig. 1) a package having vertically stacked semiconductor chips (30a and 30b) and a soft element formed between them. The package is a PCB (20) having solder balls (14) formed as terminals for connecting the package to an external circuit. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the package of Hikata and Kondo by using solder balls as terminals as taught by Derderian to connect the package to an external circuit.

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa et al. (US 6,215,182 B1) in view of Kondo et al. (JP 63-240053 A).

In re claim 10, Ozawa et al. shows (fig. 5) a device comprising at least two semiconductor chips (22-24) stacked on a substrate; and an encapsulant (26) covering the at least two semiconductor chips. Ozawa shows all of the elements of the claim except the soft element formed on a surface of at least one of the two chips but not on surfaces between the two chips. Kondo discloses (abstract and fig. 2) a soft element (flexible material 9) formed on an entire upper surface and side surface of a chip (1). The soft element is formed between the chip and the mold resin (3) to protect the

package from internal stress. When combined with Ozawa, the soft element would not be formed between the at least two semiconductor chips since Ozawa relies on a film adhesive (38) to secure the chips to each other. Furthermore, Kondo shows that the soft element is not disposed between the chip (1) and lead frame (2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the package of Ozawa by forming the soft element on the top surface of the chip and between the chip and the mold resin as taught by Kondo to protect the package from internal stress.

In re claims 11 and 12, Kondo shows (fig. 2) that the surface comprises the entire surface that is contained by a single plane or that the surface comprises part of the entire surface that is contained by a single plane (as shown in figures 1 or 3).

In re claim 13, Ozawa discloses (col. 5, lines 50-65) that the encapsulant consists of an epoxy resin.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikata et al. (US 6,133,637) as applied to claim 14 above, and further in view of Kondo et al. (JP 63-240053 A).

In re claims 17-19, Hikata shows all of the elements of the claims except the soft element contacting the entire surface of the an uppermost chip of the at least two semiconductor chips. Kondo discloses (abstract and fig. 2) a soft element (flexible material 9) formed on an entire upper surface and side surface of a chip (1). The soft element is formed between the chip and the mold resin (3) to protect the package from

internal stress. The soft element also covers the bonding wire (5), the contact pad on the chip and the bond finger (4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the package of Hikata by forming the soft element on the top surface of the chip and between the chip and the mold resin as taught by Kondo to protect the package from internal stress.

Response to Arguments

Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed with respect to claims 14-20 have been fully considered but they are not persuasive. The applicant primarily asserts that Hikata does not show all of the elements of claim 14, specifically that the soft element is formed on a side surface of one of the two semiconductor chips. The applicant further asserts that Hikata teaches away from the soft element being formed on the chip because the material (26) is an epoxy that contains a filler. The examiner believes that Hikata shows all of the elements of claims. The soft element (26) of Hikata, despite having a filler, is different (col. 6, lines 38-40) from the encapsulant material (22) that encloses the package. Hikata discloses (col. 6, lines 25-49) that the soft element (26) formed on the side of the chip (26) contains a filler to increase moisture resistance while the package contains filler to increase adhesion and provide endurance. Hikata does not suggest that the soft element (26) has a filler to harden the material. The outer package (22) is definitely harder than the inner materials so that the inner portion is protected. If the

outer resin (22) is harder than the inner resin (26), then the inner resin is a soft element. Thus, Hikata does not teach away from using soft element. Just because the applicant does not use a filler in their soft element does not mean that other known epoxies having a filler cannot be soft as well. Elastomers or epoxies are known materials in the art and may have different properties according to their chemical composition. In the case of Hikata, the epoxy (26) as shown in figure 10 is moisture resistant and different from the hard epoxy (22) that surrounds the package. Hikata shows all of the elements of the claims and this action is made final.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (571) 272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GEORGE ECKERT
PRIMARY EXAMINER

MEW

June 10, 2005